

# Darshan Thakur

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## Professional Summary

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Mechanical Engineer with MSc in Mechanical Engineering and over 3 years of design, simulation, and optimization experience across defense, mobility, and consumer domains. Skilled in CAD (SolidWorks CSWP), and hands-on research in 3D printing, thermal management, and sustainable product development.

## Education

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**Trinity College Dublin**, MSc Mechanical Engineering Sept 2024 – Sept 2025

- **Grade:** 1:1 (Distinction)
- **Focus Areas:** Advanced Product Development, Computational Analysis, and Zero-Carbon Technologies

**Mumbai University**, BE Mechanical Engineering July 2018 – August 2021

- **Grade:** 8.92 / 10
- **Focus Areas:** Finite Element Analysis, Industrial Automation, Mechanical Vibrations, Machine Design.

## Professional Experience

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**Junior Design Engineer**, Ansyscad Solutions –India January 2022 – August 2024

- Created detailed 3D CAD models and 2D drawings with GD&T, BOMs, and assembly instructions in compliance with ISO and ASME standards with SolidWorks and NX for manufacturability.
- Performed FEA including linear, non-linear, fatigue, modal, and vibration studies to ensure structural integrity.
- Conducted CFD simulations for HVAC systems in military shelters, redesigning ducting layouts for uniform airflow distribution, and optimized thermal management of electronic housings and data center enclosures.
- Applied MBD to analyze dynamic loads, kinematics, and mechanism behavior; used DEM to study particle flow and bulk handling systems.
- Optimized designs through ribbing, material selection, and geometry refinement, achieving cost and weight reductions without compromising performance.
- Coordinated with manufacturing, testing, and procurement to resolve design issues, support tooling, and deliver assemblies on schedule.
- Collaborated with clients in design reviews, incorporating feedback to enhance product performance and customer satisfaction.

Key projects:

- Defense & Aerospace: Military shelters, Missile transporters, Missile launchers
- Transportation & Mobility: Trailers, Tippers, Military tank, Cranes
- Consumer Products: Pallets, Industrial ovens, and Chillers

**Team Member**, Team MH08 Formula Racing – India January 2019 – August 2020

- Supported chassis design and material selection using CAD tools for performance and safety optimization.
- Assisted in composite manufacturing and assembly, gaining hands-on fabrication experience.
- Supported sponsorship acquisition and managed social media outreach, boosting team visibility and funding.

## Key Skills

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**CAD & Additive Manufacturing:** SolidWorks, AutoCAD, NX, Creo, Autodesk Inventor, MSLA 3D printing

**Simulation/Analysis Software:** Ansys Workbench, Simcenter FLOEFD, Hypermesh, Motion View, Fusion 360

**Design Standards:** ISO, ASME, ASTM, MIL STD

**Soft Skills:** Team collaboration, Project management, Problem-Solving, Critical thinking

**Programming Language:** MATLAB, Python

## Certifications & Memberships

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- Certified SolidWorks Professional (CSWP), Dassault Systemes
- Becoming a HVAC Professional, Alison
- Project Management Essentials Certified
- Certified in Autodesk Fusion 360 Integrated CAD/CAM/CAE, Autodesk
- Member, American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)
- Member, Engineers Ireland

## Research & Projects

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### Benchmarking and Optimizing Enhanced Natural Convection Heat Sinks

August 2025

MSc Dissertation – Trinity College Dublin

- Developed a standardized methodology to benchmark, evaluate and optimize (DOE & HEEDS) the performance of heat sink designs under natural convection.
- Applied this framework to displacement fin designs, ensuring true optimum-to-optimum comparisons against straight-fin baselines.
- Demonstrated that optimized displacement fins improved total heat transfer by 9.53% (small fins) and 11.09% (large fins) compared to optimized straight fins.
- Showed that SV1 displacement fins delivered the best mass-specific efficiency ( $Q/m$ ), achieving 5–6% higher performance than optimized straight fins, while SV2 and SV3 had negligible gains.
- Concluded that the method provides a credible benchmarking tool for evaluating trade-offs between overall heat transfer and weight-specific performance in future passive cooling designs.

### Experimental evaluation of advanced UAV noise reduction technology

November 2024

- Reviewed literature on UAV aeroacoustic noise and identified serrated and porous blade modifications as candidate solutions.
- Selected MSLA 3D printing for prototype manufacturing based on resolution, cost, and aerodynamic surface quality.
- Designed, fabricated, and tested three blade variants against a baseline using a thrust stand and microphone array.
- Found that trailing edge serrations with anhedral eagle winglet improved thrust by 31.96% and reduced noise by 21.20%.
- Determined that serrated leading edge with porous trailing edge gave stable 12.25% noise reduction but reduced thrust by 24.95%, highlighting aerodynamic–acoustic trade-offs.

### PortaVax

April 2025

Design and Development of Portable Vaccine Cooler for Storage and Transport

- Investigated cold-chain challenges in rural healthcare delivery and selected Phase Change Material (ATP-6) as the passive cooling technology after reviewing alternatives such as vacuum insulation panels.
- Designed a lightweight, backpack-style cooler with polypropylene casing, PIR insulation, and modular PCM blocks, capable of storing up to 840 vaccine vials.
- Developed analytical thermal resistance models and validated them with CFD simulations under 35 °C ambient conditions.
- Demonstrated cooling performance below 8 °C for 12.8 hours with 2.22 kg PCM, extended to more than 25 hours using 4.4 kg PCM blocks.
- Delivered a cost-effective prototype at €249, significantly outperforming commercial competitors in both storage capacity and cooling duration.

Explore more innovative research projects at: [thakurd9.github.io/Portfolio/](https://thakurd9.github.io/Portfolio/)